Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A method of simultaneously transmitting signals over a channel ~~for radio communication~~ between a first device having N plurality of antennas and a second device having M plurality of antennas, the method comprising:

processing a vector **s** representing L signals $[s_1 \ldots s_L]$ with a transmit matrix **A** that is computed to maximize capacity of the channel by multiplying the vector **s** with the transmit matrix **A**, wherein the transmit matrix **A** is equal to **VD**, where **V** is an eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, **H** is the channel response from the first device to the second device, $\mathbf{D} = \mathrm{diag}(d_1,\ldots,d_L)$ and $|d_p|^2$ is the transmit power for $p = 1$ to L ~~between the first device and the second device subject to a power constraint that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, and that weights the L signals~~ ~~$[s_1 \ldots s_L]$~~ ~~for simultaneous transmission along the eigenvectors of the channel between the N plurality of antennas and M plurality of antennas of the second device~~.

2. (currently amended): The method of claim 1, wherein the ~~processing comprises processing the vector s with the~~ transmit matrix **A** ~~that~~ is computed subject ~~to the~~ to a power constraint requiring that the power emitted by one or more of the N plurality of antennas is ~~being~~ different ~~for one or more of the N plurality of antennas~~.

3. (currently amended): The method of claim 1, wherein the ~~processing comprises processing the vector s with the~~ transmit matrix **A** ~~that~~ is computed subject ~~to the~~ to a power constraint requiring that the power emitted by ~~being the same for~~ each of the N plurality of antennas is the same.

4. (currently amended): The method of claim 3, wherein the ~~processing comprises processing the vector s with the transmit matrix A that is computed subject to the power constraint for each of the N plurality of antennas being~~ emitted power is equal to a total maximum power emitted by all of the N plurality of antennas combined divided by N.

Claim 5 (canceled)

6. (currently amended): The method of claim 1 ~~claim 5~~, wherein when $N \leq M$, the processing comprises multiplying the vector **s** with the transmit matrix **A**, where $\mathbf{D} = \mathbf{I} \cdot \mathrm{sqrt}(P_{max}/N)$, and **I** is the identity matrix, such that the power transmitted by each of the N plurality of antennas is the same and equal to P_{max}/N.

7. (currently amended): The method of claim 1 ~~claim 5~~, wherein when $N < M$, ~~the processing comprises multiplying the vector s with the transmit matrix A, where~~ $\mathbf{D} = \mathrm{sqrt}(d \cdot P_{max}/N_{Tx}) \cdot \mathbf{I}$, such that the power transmitted by antenna i for i = 1 to N is $(d \cdot P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and $d_p = d$ for p = 1 to L.

8. (currently amended): The method of claim 7, wherein ~~the processing comprises multiplying the vector s with the transmit matrix A, where~~ $d = 1/z$ and $z = \max_i \{(\mathbf{VV}^H)_{ii}\}$, such that the maximum power from any of the N plurality of antennas is P_{max}/N and the total power emitted from the N plurality of antennas combined is between P_{max}/M and P_{max}.

9. (currently amended): The method of claim 7, wherein ~~the processing comprises multiplying the vector s with the transmit matrix A, where~~ d = 1, such that the power emitted by antenna i for i = 1 to N is $(P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{max}/M.

10. (previously presented): The method of claim 1, and further comprising:

receiving at the M plurality of antennas signals transmitted by the first device; and

processing the signals received at each of the plurality of M antennas with receive weights and combining the resulting signals to recover the L signals.

11. (previously presented): The method of claim 1, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and wherein the processing comprises multiplying the vector **s** with a transmit matrix **A**(k) at each of a plurality of sub-carriers k.

12. (currently amended): A radio communication device <u>for simultaneously transmitting signals over a channel</u>, <u>the radio communication device</u> comprising:

a. N plurality of antennas;

b. N plurality of radio transmitters each coupled to a corresponding one of the plurality of antennas; and

c. a baseband signal processor coupled to the N plurality of radio transmitters to process a vector **s** representing L signals $[s_1 \ldots s_L]$ with a transmit matrix **A** that is computed to maximize capacity of the channel <u>by multiplying the vector **s** with the transmit matrix **A**, wherein the transmit matrix **A** is equal to **VD**, where **V** is an eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, **H** is the channel response from the first device to the second device, $\mathbf{D} = \mathrm{diag}(d_1,\ldots,d_L)$ and $|d_p|^2$ is the transmit power for p = 1 to L</u> ~~between the first device and the second device subject to a power constraint~~

~~that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, and that weights the L signals [s_1 ... s_L] for simultaneous transmission along the eigenvectors of the channel between the N plurality of antennas and a plurality of antennas of the second device~~.

13. (currently amended): The device of claim 12, wherein the ~~baseband signal processor processes the vector s with a~~ transmit matrix **A** ~~that~~ is computed subject ~~to the~~ to a power constraint requiring that the power emitted by one or more of the N plurality of antennas is ~~being~~ different ~~for one or more of the N plurality of antennas~~.

14. (currently amended): The device of claim 12, wherein the ~~baseband signal processor processes the vector s with a~~ transmit matrix **A** ~~that~~ is computed subject ~~to the~~ to a power constraint requiring that the power emitted by ~~being the same for~~ each of the N plurality of antennas is the same.

15. (currently amended): The device of claim 14, wherein the ~~baseband signal processor processes the vector s with a transmit matrix A that is computed subject to the power constraint for each of the N plurality of antennas being~~ emitted power is equal to a total maximum power emitted by all of the N plurality of antennas combined divided by N.

Claim 16 (canceled)

17. (currently amended): The device of claim 12 ~~claim 16~~, wherein when N $\leq$ M, ~~the baseband signal processor multiplies the vector s with the transmit matrix A that is computed where~~ $\mathbf{D} = \mathbf{I} \cdot \mathrm{sqrt}(P_{max}/N)$, and **I** is the identity matrix, such that

the power transmitted by each of the N plurality of antennas is the same and equal to P_{max}/N.

18. (currently amended): The device of claim 12 ~~claim 16~~, wherein when N < M, the baseband signal processor multiplies the vector **s** with the transmit matrix **A** that is computed where $\mathbf{D} = \text{sqrt}(d \cdot P_{max}/N_{Tx}) \cdot \mathbf{I}$ such that the power emitted by antenna i for i = 1 to N is $(d \cdot P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and $d_p = d$ for p = 1 to L.

19. (currently amended): The device of claim 18, wherein ~~the baseband signal processor multiplies the vector s with the transmit matrix A that is computed where~~ $d = 1/z$ and $z = \max_i\{(\mathbf{VV}^H)_{ii}\}$ such that the maximum power from any antenna of the N plurality of antennas is P_{max}/N and the total power emitted from the N plurality of antennas combined is between P_{max}/M and P_{max}.

20. (currently amended): The device of claim 18, wherein ~~the baseband signal processor multiplies the vector s with the transmit matrix A that is computed where~~ d = 1, such that the power emitted by antenna i for i = 1 to N is $(P_{max}/N) \cdot (\mathbf{VV}^H)_{ii}$, and the total power emitted from the N plurality of antennas combined is P_{max}/M.

21. (original): The device of claim 12, wherein each of the L signals is baseband modulated using a multi-carrier modulation process, and the baseband signal processor multiplies the vector **s** with a transmit matrix **A**(k) at each of a plurality of sub-carriers k.

22. (currently amended): A radio communication system for simultaneously transmitting signals over a channel, the radio communication system comprising:

a. a first device comprising:

i. N plurality of antennas;

ii. N plurality of radio transmitters each coupled to a corresponding one of the plurality of antennas; and

iii. a baseband signal processor coupled to the N plurality of radio transmitters to process a vector **s** representing L signals $[s_1 \ldots s_L]$ with a transmit matrix **A** that is computed to maximize capacity of the channel by multiplying the vector **s** with the transmit matrix **A**, wherein the transmit matrix **A** is equal to **VD**, where **V** is an eigenvector matrix for $\mathbf{H}^H\mathbf{H}$, **H** is the channel response from the first device to the second device, $\mathbf{D} = \mathrm{diag}(d_1,\ldots,d_L)$ and $|d_p|^2$ is the transmit power for p = 1 to L ~~between the first device and the second device subject to a power constraint that the power emitted by each of the N plurality of antennas is less than or equal to a maximum power, and that weights the L signals [s1 ... sL] for simultaneous transmission along the eigenvectors of the channel between the N plurality of antennas and a plurality of antennas of a second device~~;

b. the second device comprising:

i. M plurality of antennas;

ii. M plurality of radio receivers each coupled to a corresponding one of the plurality of antennas; and

iii. a baseband signal processor coupled to the N plurality of radio receivers to process signals output by the plurality of radio receivers with receive weights and combining the resulting signals to recover the L signals $[s_1 \ldots s_L]$.

23. (currently amended): The system of claim 22, wherein the ~~baseband signal processor of the first device processes the vector s with the~~ transmit matrix **A** ~~that~~ is computed subject ~~to the~~ to a power constraint requiring that the power emitted by one or more of the N plurality of antennas is ~~being~~ different ~~for one or more of the N antennas~~.

24. (currently amended): The system of claim 23, wherein the ~~baseband signal processor of the first device processes the vector s with the~~ transmit matrix **A** that is computed subject ~~to the~~ to a power constraint requiring that the power emitted by ~~being the same for~~ each of the N plurality of antennas is the same.

25. (currently amended): The system of claim 24, wherein the ~~baseband signal processor of the first device processes the vector s with the transmit matrix **A** that is computed subject to the power constraint for each of the N antennas being~~ emitted power is equal to a total maximum power emitted by all of the N antennas combined divided by N.

Claim 26 (canceled)